

the curette, exposing small pockets of pus and masses of exudate which completely covered the sinus, and the bone was removed in every direction until healthy dura appeared. The examination of the vein from the knee to the tip of the jugular bulb gave no evidence of thrombus and a long incision gave a free hemorrhage from both ends without clots. This hemorrhage was controlled by packing, with a superposition of moist dressing. On the day following the operation there was no marked improvement, but the tongue was moist, but meningeal irritation had not increased. The laboratory finding of pus from the mastoid showed streptococci. On the next day, there being little change in the condition, a lumbar puncture was made. The spinal fluid was found normal and not under pressure. Under these conditions the treatment consisted in nursing, the necessary surgical dressings, and the patient made a good recovery, being able to leave the hospital twenty-three days after the operation.

PATHOLOGY AND BACTERIOLOGY

UNDER THE CHARGE OF

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Observations on the Stability of the Erythrocytes of the Ox, Pig and Sheep.—Though it is customary to use sheep's corpuscles in preparing the usual amboceptor for the Wassermann test, experience has shown that these elements in the Noguchi method are not so stable nor so resistant to human sera as the corpuscles of various other animals. LYON (*Jour. Infect. Dis.*, 1918, xxii, 49) showed that erythrocytes of the ox and pig give even better results than those of the sheep. A working amboceptor was made after five intravenous injections of ox corpuscles into a rabbit and proved to be so satisfactory with the Noguchi method that the sheep system was gradually abandoned and the ox system used exclusively, employing two antigens, alcoholic extract of human heart and cholesterinized extract. Experiments were made by testing the erythrocytes of the pig as well as those of the sheep and ox with a varying number of human sera, 123 in all. In no instance were the sheep cells more resistant than those of the ox or pig. No satisfactory explanation of this fact can be given. There is no explanation nor proof other than the observed fact that human sera contains a natural antisheep amboceptor. Zoologically the sheep and the ox are closely related, and one would expect their corpuscles to behave similarly under the influence of a serum obtained from an animal as zoologically remote as man. On the other hand, the zoologically unrelated ox or pig behave similarly, so far as their erythrocytes are concerned, under the influence of human serum. The well-known ease with which the antisheep amboceptor can be prepared appears in part at least to depend on some inherent weakness of the sheep erythro-

cytes. But the fact that they are unstable makes their use in complement-fixation tests with human serum unreliable. Ox erythrocytes seem to have better keeping qualities than the erythrocytes of the pig or sheep.

Studies in Immunity against *Staphylococcus Pyogenes Aureus*.—

The important part played by liver and spleen in ridding the blood stream of infecting organisms was emphasized years ago by Wyssokowitsch and Werigo. Recently, BARTLETT and OZAKI contributed a very enlightening paper (*Jour. Med. Research*, 1917, xxxv, 465) on the same subject, showing the relationship of phagocytosis of bacteria by these organs and by the lungs. In continuation of this study, ITO (*Jour. Med. Research*, 1917, xxxvii, 189), of the same laboratory, has considered the fate of living staphylococci when introduced into the jugular vein of actively immunized dogs and of killed bacteria introduced intravenously into normal dogs. Positive agglutination in dilutions of 6000 to 10,000 was used as the index of immunity. The animals were killed at periods varying from ten minutes to ninety-six hours after the last injection. Bacteria could not be found in blood smears later than one hour after injection, and they never reappeared. No mention is made of cultures. In the dog killed ten minutes after injection very few cocci were seen in the blood smears, and these were within the leukocytes. The bacteria had disappeared from the tissues within twenty-four hours. The author's conclusions are as follows. "(1) Bacteria introduced into actively immunized dogs disappear sooner than in normal dogs, and never were found in any part of the body. (2) Bacteria that accumulate in the lungs in the earlier stage are transported to other organs, but they are not found in the spleen in large numbers, while they are more numerous in the liver; (3) in the several organs it appears that both fixed and wandering cells have the ability to engulf, as well as to digest, bacteria throughout all stages; (4) as to the fate of the killed bacteria introduced into normal dogs, they are destroyed somewhat more quickly than the living bacteria introduced into immunized dogs and they provoke no changes evident histologically in the tissues." OZAKI (*Jour. Med. Research*, 1917, xxxvii, 247), in order to study the phagocytic properties of fixed tissue cells, perfused the excised spleen of a dog with Locke's solution for some hours and then injected into the organ a culture of *Staphylococcus aureus*, not through the blood channels but directly into the pulp. As a control the same organisms were injected deeply into the spleen *in situ* in the living animal. "Wandering cells, as well as fixed tissue cells, show, if at all, but slight necrobiotic changes, and their function is well carried out in so far as bacterial ingestion is concerned." In the spleen of the living animal, as well as that kept alive by means of Locke's solution, the bacteria injected into the parenchyma are principally ingested by splenic cells, polymorphonuclear leukocytes and to some extent also by living endothelial cells and endothelial leukocytes. In the living animal the grade of phagocytosis by the polymorphonuclear leukocytes found in the spleen is on an average far more pronounced than that by splenic cells. A similar relation is also observed, although somewhat less marked, within the spleen tissue kept alive by means of Locke's solution, provided that these cells do not undergo any, even slight, necrobiosis.

A Contribution to the Study of War Nephritis.—Since the beginning of the war a number of papers have appeared dealing with the occurrence of nephritis among soldiers on active duty. The various observers have insisted upon the occurrence of a disease among soldiers which bears no relation to any previous kidney infection or systemic illness as may be found in civil life. It is obvious that with the aggregation of such large numbers of men there will be found sporadic cases of recurrent nephritis which escaped the attention of the recruiting officers. Besides this, with the appearance of active infections like typhoid, dysentery, pneumonia or those of the heart, Bright's disease in different grades of severity are met with in the frequency seen in civil hospitals. Over and above this, however, there has appeared a type of nephritis bearing no relation to a previous illness nor appearing as a complication of another disease. This form of nephritis has occurred among the men on active duty in the trenches, while the soldiers who have not been on the firing line and the civilian population in the near vicinity are relatively or completely immune to the affection. DUNN and MCNEE (*British Med. Jour.*, 1917, ii, 745) have lent particular attention to the study of nephritis and have collected many cases among the British Army at the front. For obvious reasons they are unable to state the exact number of men examined and the incidence of the disease. They point out that they were unable to associate the varying incidence in different companies with the climatic conditions nor with the conditions under which the men were living. The disease may be very insidious in its onset, the most common clinical manifestation being dyspnea. Next in frequency they found edema, pain in head, epigastrium or back, sore throat and hoarseness, in the order named. The edema appeared as a puffiness about the face or extremities. Fever was present in only a few cases and uremia was rarely seen. The urine contained large quantities of albumin, but showed little diminution in quantity. Casts were always present in varying numbers. The bacteriological examination of the urine showed the presence of bacteria in more than half of the cases examined, the streptococci being the commonest organisms found. The authors had an opportunity of studying the tissues from 35 cases of true war nephritis, in which the characteristic lesion was of the glomerular type. The glomeruli were cellular, showing some leukocytes and lymphocytes, but never showing blood thrombi. Granular occlusions of the glomerular loops were observed in a few cases. A true inflammatory exudate was wanting and the interstitial tissue between the tubules showed but little reaction. Various grades of degeneration of the tubular epithelium was observed, but it was never the outstanding change. The medulla of the kidney showed an edema and hyaline change of the connective tissue. The authors also observed peculiar changes in the lung. These consisted of an interstitial edema, without an associated pneumonic process. The lung lesions, they claim, are suggestive of a respiratory irritant, not unlike that obtained in gas poisoning. In the brain, minute hemorrhages about small vessels were also seen. The authors state there is no evidence that the nephritis is due to bacterial infection. They suggested a relation between the pulmonary lesion and the changes occurring in the kidney.

Experimental Immunity to Cancer.—BULLOCH and ROHDENBERG (*Jour. Cancer Research*, 1917, ii, 455 and 465) have contributed some interesting experiments on the relation of induced cancer immunity to tissue growth and tissue regeneration and on the possibilities of an immune influence by splenectomy. Immune substances seem to arise from living cells, whether from the products of metabolism of their growth or of their death or of growth followed by death. The growth power of embryo cartilage is greater than that of embryo skin, yet when the former was injected into one series of rats, and the latter into another, and both series shortly inoculated with Flexner-Jobling carcinoma, the percentage of immunity to this was as 19 to 30, *i. e.*, in favor of those rats injected with embryo skin. The authors suggest that superiority of the skin in cell elements and in active proliferation may account for its greater power for stimulating immunity. To determine the immunizing action of degenerative metabolites, large doses of embryo skin were injected for purposes of immunization and degenerative changes occurring early, much necrotic material resulted. Later these rats were injected with Flexner-Jobling carcinoma, and this material was removed and studied in various stages of degeneration. Fully two-thirds of it showed complete degeneration before the fifth day, but immunity had not arisen in all. "It is impossible to determine by the local reaction of the animal toward the immunizing agent, or by the condition of that agent, whether an animal will be susceptible or immune to a transplantable tumor." These workers then wished to investigate whether increasing absorption of products of cell-degeneration might not favor immunity, and they used the Flexner-Jobling carcinoma, which does not produce concomitant immunity nor that which arises when a tumor grows for a period and then recedes. Degenerative products were obtained by transplanting into the shoulder of a rat the tumor mass which for eighteen days had been in its side. Eleven days later the same tumor strain was injected, but the degree of immunity was about the same in these rats as in the controls. In another experiment it was shown that an initial small dose gives more immunity than a large one. The authors conclude that "induced immunity to transplanted cancer is not solely due to growth or the metabolites of growth of the immunizing agent, nor is it due to death and the degenerative metabolites of the injected material." The experiments involving splenectomy were performed because of the alleged influence of lymphocytes in immunity to transplanted tumors. Using a tumor which is spontaneously absorbed, they showed that "splenectomy does not influence the persistence of immunity in animals." Neither did removal of spleen affect the regression of a previously injected tumor producing concomitant immunity. Removal of the spleen or testes had no effect upon the immunity induced in adult mice by embryo emulsion. Further, splenectomy neither increased the percentage of takes nor favored the growth of spontaneous tumor grafts.